



## Polytetrafluoroethylene ( PTFE ) - Material Information

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### General Description:

**Common Brand names :**Fluon Hostaflon TF Teflon TFE

**General Description :** A totally fluorinated polymer that is very frequently called Teflon®. This can cause confusion as DuPont also use this brand name for a family of related fluoropolymers. It is semi-crystalline, semi-opaque and white. It has outstanding chemical resistance being unaffected by almost all chemicals and also has a very high oxygen index (i.e. is inherently non-flam). It has a very low coefficient of friction and is stable to high temperatures. It is soft, easily deformed, very prone to creep and low in strength with poor radiation resistance. It is expensive and cannot be melt-processed (although in theory it melts at 327C, its melt viscosity is virtually infinite) and so is formed by powder sintering methods.

Industrial applications include bearings, seals, O-rings, high temperature electrical insulation, non-stick coatings and linings for vessels etc, etc. Its unusual properties make it invaluable for a wide range of laboratory applications.

### Chemical Resistance

Acids - concentrated	Good
Acids - dilute	Good
Alcohols	Good
Alkalies	Good
Aromatic hydrocarbons	Good
Greases and Oils	Good
Halogenated Hydrocarbons	Good
Halogens	Good
Ketones	Good

### Electrical Properties

Dielectric constant @1MHz	2.0-2.1
Dielectric strength ( kV mm <sup>-1</sup> )	50-170
Dissipation factor @ 1MHz	0.0003 - 0.0007
Surface resistivity ( Ohm/sq )	10 <sup>17</sup>
Volume resistivity ( Ohmcm )	10 <sup>18</sup> -10 <sup>19</sup>

### Mechanical Properties



Coefficient of friction	0.05-0.2
Elongation at break ( % )	400
Hardness - Rockwell	D50-55 - Shore
Izod impact strength ( J m <sup>-1</sup> )	160
Poisson's ratio	0.46
Tensile modulus ( GPa )	0.3-0.8
Tensile strength ( MPa )	10-40

**Physical Properties**

Density ( g cm <sup>-3</sup> )	2.2
Flammability	V0
Limiting oxygen index ( % )	95
Radiation resistance	Poor
Refractive index	1.38
Resistance to Ultra-violet	Excellent
Water absorption - over 24 hours ( % )	0.01

**Thermal Properties**

Coefficient of thermal expansion ( ×10 <sup>-6</sup> K <sup>-1</sup> )	100-160
Heat-deflection temperature - 0.45MPa ( C )	120
Heat-deflection temperature - 1.8MPa ( C )	54
Lower working temperature ( C )	-260
Specific heat ( J K <sup>-1</sup> kg <sup>-1</sup> )	1000
Thermal conductivity @23C ( W m <sup>-1</sup> K <sup>-1</sup> )	0.25
Upper working temperature ( C )	180-260

## Properties for Polytetrafluoroethylene Film

Property	Value
Dielectric Strength @25μm thick	kV mm <sup>-1</sup> 160
Dissipation Factor @1MHz	<0.0001
Elongation at Break	% 100-400
Permeability to Carbon Dioxide @25C	x10 <sup>-13</sup> cm <sup>3</sup> . cm cm <sup>-2</sup> s <sup>-1</sup> Pa <sup>-1</sup> 7
Permeability to Hydrogen @25C	x10 <sup>-13</sup> cm <sup>3</sup> . cm cm <sup>-2</sup> s <sup>-1</sup> Pa <sup>-1</sup> 7
Permeability to Nitrogen @25C	x10 <sup>-13</sup> cm <sup>3</sup> . cm cm <sup>-2</sup> s <sup>-1</sup> Pa <sup>-1</sup> 1
Permeability to Oxygen @25C	x10 <sup>-13</sup> cm <sup>3</sup> . cm cm <sup>-2</sup> s <sup>-1</sup> Pa <sup>-1</sup> 3
Permeability to Water @25C	x10 <sup>-13</sup> cm <sup>3</sup> . cm cm <sup>-2</sup> s <sup>-1</sup> Pa <sup>-1</sup> 25?

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